

## Claims

- [1] A method for designing a front directional array antenna for suppressing a back signal used in a wireless communication, comprising:
- (a) an analogous pattern element arranging step for arranging, on a reflecting panel which is a conductor at a predetermined interval, elements having mutual analogous emission pattern characteristic for a short axis (x axis) in which the number of arrangements is small and for a long axis (y axis) which is a perpendicular direction to the x axis;
  - (b) a reception balancing step for forming, in the edge of the reflecting panel, reflecting surfaces having a predetermined angle and length which are symmetric centering on the front surface to direction of electric wave arrived to the elements located in the edge;
  - (c) an x-axis direction signal suppressing step, by x-axis series distribution and synthesis, for performing as many series distribution and synthesis suppressing transfer characteristic in an x-axis direction as the number of y rows, for output distribution and synthesis for the x axis arrangement, in synthesizing a signal of the array antenna after the step (b);
  - (d) a y-axis direction signal suppressing step, by y-axis series distribution and synthesis, for performing series distribution and synthesis suppressing transfer characteristic in a y-axis direction in finally performing distribution and synthesis in the y-axis direction, for output distribution and synthesis for the x axis arrangement; and
  - (e) a back-suppressed sold pattern outputting step for providing result of arrangement signal distribution and synthesis of the y axis to a contact means outside the antenna device.
- [2] The method of claim 1, wherein at the step (a), the element performs load-matching using a small dipole which is relatively smaller than a  $\lambda/2$  dipole,
- has a low height of less than  $\lambda/4$  from the reflecting panel of the small dipole element,
  - has a broad width of greater than  $\lambda/8$  as a width of the small dipole element,
  - and
  - has a front directional element added to the small dipole element.
- [3] The method of claim 1, wherein as the series distribution for suppressing the transfer characteristics for the x or y axis, one of the binomial distribution function, Chebyshev function, Taylor function, and cosine on pedestal is selectively applied.

- [4] A front directional array antenna used in a wireless communication system, comprising:
- a plurality of front direction antenna elements 311 having a broad width of greater than  $\lambda/8$  as a width of a small dipole element 323 and coupling a front directional element 324 to have front directional characteristic and non-interference characteristic between the neighboring elements;
  - a reflecting panel for plane-arranging and fixing the plurality of antenna elements at a height H of less than  $\lambda/4$  in column (x) and row (y) and having a corner reflecting portion 322 which has a reflecting curvature of 20 to 60 degree which has a similar height to a height that the antennal element is fixed to adjust balance of emission pattern between the antennal elements located on both edge ends;
  - an x-axis series distribution portion 312 applying a series distribution according to the binomial distribution to form a zero point for a short axis (x) in which the number of element arrangement is small among the antenna elements 311 arrange and fixed in column and row;
  - a y-axis series distribution portion 313 applying a series distribution according to Chebyshev function with respect to a long axis in which the number of arrangements is great to the signal of the x-axis series distribution portion 312 to form a zero point for the y-axis; and
  - an input-output portion 314 outputting a combination signal of the y-axis series distribution portion 313 to the external portion.